Dizi: Workload Tracing, Sharing, and Reproducing for XR Devices and Metaverse Systems

Jesse Donkervliet

✉️ jesse.donkervliet@vu.nl
🐦 @jdonkervliet
🌐 https://www.jdonkervliet.com
Players in Eve Online broke a world record — and then the game itself

Developers said they’re not ‘able to predict the server performance in these kinds of situations’

By Charlie Hall | @Charlie_L_Hall | Jan 5, 2021, 2:54pm EST

How to Deploy and Orchestrate Metaverse Infrastructure?

Our approach: integrate novel application-level architectures, service placement and offloading approaches, and microservice orchestration.

Figure source: Can My WiFi Handle the Metaverse? A Performance Evaluation Of Meta’s Flagship Virtual Reality Hardware, Jesse Donkervliet, Matthijs Jansen, Animesh Trivedi, Alexandru Iosup (2023), ICPE HotCloudPerf 2023
Experiment Setup

1. Poll for input

2. Simulate and render frame

3. Send frame to display

≥72 Hz
(<14 ms per iteration)

Poll performance counters (1 Hz)

1.5 RnR tracer

2. Simulate and render frame

App

Perf. monitor

Network emulation

Input trace archive

Node

@Large Research
Massivizing Computer Systems
VR streaming playable with (relatively) low bandwidth.
Further Reading

Can My WiFi Handle the Metaverse? A Performance Evaluation Of Meta’s Flagship Virtual Reality Hardware, Jesse Donkervliet, Matthijs Jansen, Animesh Trivedi, Alexandru Iosup, ICPE HotCloudPerf 2023

Meterstick: Benchmarking Performance Variability in Cloud and Self-hosted Minecraft-like Games, Jerrit Eickhoff, Jesse Donkervliet, Alexandru Iosup, ICPE 2023

Servo: Increasing the Scalability of Modifiable Virtual Environments Using Serverless Computing, Jesse Donkervliet, Javier Ron, Junyan Li, Tiberiu Iancu, Cristina L. Abad, Alexandru Iosup, ICDCS 2023

Dyconits: Scaling Minecraft-like Services through Dynamically Managed Inconsistency, Jesse Donkervliet, Jim Cuijpers, Alexandru Iosup, ICDCS 2021

Towards Supporting Millions of Users in Modifiable Virtual Environments by Redesigning Minecraft-Like Games as Serverless Systems, Jesse Donkervliet, Animesh Trivedi, Alexandru Iosup, HotCloud 2020